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09/675,975	09/29/2000	Gregory Henry	042390.P8940	1733

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Kenneth B Paley
Blakely Sokoloff Taylor & Zafman LLP
Seventh Floor
12400 Wilshire Boulevard
Los Angeles, CA 90025-1026

EXAMINER	
NAHAR, QAMRUN	
ART UNIT	**PAPER NUMBER**
2124	

DATE MAILED: 08/12/2004

16

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/675,975	HENRY, GREGORY
	Examiner	Art Unit
	Qamrun Nahar	2124

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *06 July 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-10,13-20,22,23 and 25-30* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1, 4-10, 13-20, 22-23 and 25-30* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is in response to the RCE filed on 7/6/04.

2. The rejection under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720) to claims 1-2, 4-11, 13-23 and 25-30 is moot in view of the new ground(s) of rejection.

3. The rejection under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538) to claims 3, 12 and 24 is moot in view of applicant's amendments.

4. Claims 2-3, 11-12, 21 and 24 have been cancelled.

5. Claims 1, 10 and 20 have been amended.

6. Claims 1, 4-10, 13-20, 22-23 and 25-30 are pending.

7. The objection to claim 20 is pending.

8. Claims 10, 13-19, 20, 22-23 and 25-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

9. Claims 1, 4-10, 13-20, 22-23 and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538).

Response to Amendment

Claim Objections

10. Claim 20 is objected to because of the following informalities: "met" on line 8 of the claim should be "met;". Appropriate correction is required.

Claim Rejections - 35 USC § 112

11. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

12. Claims 10, 13-19, 20, 22-23 and 25-30 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

13. Claim 10 recites the limitation "the machine language routine" in line 8 of the claim. There is insufficient antecedent basis for this limitation in the claim. This limitation is interpreted as "the object language routine".

Claims 13-19 are rejected for dependency upon rejected base claim 10 above.

14. Claim 20 recites the limitation "an evaluator to determine if **the** characteristics of an execution of **the** optimized object routine is in accordance with a stopping criterion and if not, to repeat an execution of **the** optimizer, an execution of **the** re-optimized code, and an execution of **the** execution characteristic measurer, until the stopping criterion is met" in lines 4-8 of the claim. There is insufficient antecedent basis for this limitation in the claim. This limitation is

interpreted as "an evaluator to determine if **a** characteristics of an execution of **an** optimized object routine is in accordance with a stopping criterion and if not, to repeat an execution of **an** optimizer, an execution of **a** re-optimized code, and an execution of **an** execution characteristic measurer, until the stopping criterion is met".

Claims 22-23 and 25-30 are rejected for dependency upon rejected base claim 20 above.

Claim Rejections - 35 USC § 103

15. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

16. Claims 1, 4-10, 13-20, 22-23 and 25-30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538).

Per Claim 1 (Amended):

Hayashi teaches a method of compiling a source language routine ("An object of the present invention is to provide a compiling apparatus and a compiling method that meet a variety of requirements for optimization. A compiler according to the present invention provides a high-performance object code, according to a target architecture, a source program, and optimization requirements." in column 3, lines 6-14); generating in a computer system an intermediate language routine from the source language routine ("In Fig. 2, the front end 2 changes the source

program 1 into the intermediate representations." in column 5, lines 48-49); specifying an initial value of each routine variable ("Data 20 corresponds to the data 10 of Fig. 1 and indicates the characteristics of source-program-dependent intermediate representations provided by the front end." in column 6, lines 56-59; Data 20 contains specified initial values for routine variables, which are used for subsequent optimizations; that is, Hayashi inherently teaches specifying an initial value of each routine variable); performing an optimizing change to the intermediate language routine that results in an altered intermediate language routine; and generating a machine language routine in a computer system from the altered intermediate language routine ("In Fig. 3, step S1 picks up optimization functions to be held in a compiler. The optimization data 22 includes a list of optimization functions corresponding to the front-end intermediate representation data 20 and code providing intermediate representation data 21, and the step S1 selects some of the optimization functions from the data 22, so that they are executed by the optimizing compiler. This selection may be made by a person who prepares the compiler. ... Step S3 determines a compiler structure in two steps S30 and S31. The step S30 determines the number of times of changing intermediate representations. In principle, this number corresponds to the number of classes of the classified optimization functions. The number may also be determined according to the types of intermediate representations and the intermediate representation dependencies of the optimization functions. The step S31 determines the optimization functions in three steps S310, S311, and S312. .... The step S312 determines the execution order of the optimization functions according to the front-end and code-providing dependencies of the functions. Once the optimizing structure is determined, the intermediate representation optimizing and changing processes are carried out according to the determined

results. Namely, the intermediate representations are changed and optimized phase by phase, to provide codes that form an optimized object program." in column 6, lines 66-68 to column 7, lines 1-6; and column 7, lines 26-51).

Hayashi does not explicitly teach before said performing: generating a machine language routine in a computer system from the intermediate language routine; executing the machine language routine from the main memory of the first computing system using the initialized values; measuring a characteristic of the execution; initializing the variables to the specified initial value; executing the machine language routine from a main memory of a first computing system having the architecture of a target computer system using the initialized values; measuring a characteristic of the execution; and evaluating whether a stopping criterion after said executing is met and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric.

Buzbee teaches before said performing: generating a machine language routine in a computer system from the intermediate language routine (column 3, lines 32-33); executing the machine language routine from the main memory of the first computing system using the initialized values; and measuring a characteristic of the execution (column 3, lines 33-34); initializing the variables to the specified initial value; executing the machine language routine from a main memory of a first computing system having the architecture of a target computer system using the initialized values ("application 53 is run, in a step 55, under a translator ... Table 2 below shows an example of how the source code in Table 1 looks when compiled into

object code ... Store 0 in sum" in column 6, lines 4-5 and lines 41-67; Tables 1 and 2; and Fig. 6; for example, the variable sum is initialized to 0, which is the specified initial value); measuring a characteristic of the execution ("In order to gather profile information, application 53 is run, in a step 55, under a translator." in column 6, lines 4-5 and Fig. 6); and evaluating whether a stopping criterion after said executing is met and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met ("The process may be repeated to further optimize optimized application 53. Profile information 55 gathered from each dynamic translation and execution of optimized application 53 is used to further optimize application 53 at a next compile. The annotations are adjusted on each compilation to obtain additional profile information which will be used in future compilations. This iterative process can continue until no further optimizations to optimized application 53 can be found, or until the performance of optimized application 53 satisfies the developer/tester of optimized application 53." in column 6, lines 18-28 and Fig. 6; the machine language routine having a best measured characteristic is inherently saved).

Granston teaches that the characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric (column 4, lines 34-48).

It would have been obvious to one having ordinary skill in the computer art at the time of the invention was made to modify the method disclosed by Hayashi to include before said performing: generating a machine language routine in a computer system from the intermediate language routine; executing the machine language routine from the main memory of the first computing system using the initialized values; measuring a characteristic of the execution;

initializing the variables to the specified initial value; executing the machine language routine from a main memory of a first computing system having the architecture of a target computer system using the initialized values; measuring a characteristic of the execution; and evaluating whether a stopping criterion after said executing is met and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric using the teaching of the combination of Buzbee and Granston. The modification would be obvious because one of ordinary skill in the art would be motivated to further optimize optimized object code based on run-time profile data and to reduce execution time and code size by optimizing code.

Per Claim 4:

The rejection of claim 1 is incorporated, and Hayashi further teaches including defining a plurality of segments within the intermediate language routine, each said segment comprising consecutive intermediate language routine statements wherein no segment includes a same intermediate language routine statement, and the performing an optimizing change is performed within one of the segments (column 6, lines 19-22 and column 7, lines 7-51).

Per Claim 5:

The rejection of claim 1 is incorporated, and Hayashi further teaches including determining ordering dependencies in said intermediate language routine wherein said

performing an optimizing change includes maintaining the determined ordering dependencies (column 10, lines 34-40).

Per Claim 6:

The rejection of claim 1 is incorporated, and Hayashi further teaches wherein the optimizing change comprises one of a generic optimization, a reordering, a user selectable reordering, a user selectable global reordering, a user selectable insertion of at least one instruction in a selectable position in the intermediate language routine, and a user selectable removal of at least one instruction from a selectable position in the intermediate language routine; wherein each optimizing change does not affect the intermediate language routine integrity (column 8, lines 37-48; column 10, lines 14-43; and Fig. 5).

Per Claim 7:

The rejection of claim 1 is incorporated, and Buzbee further teaches including after the generating the machine language routine and before the executing the machine language routine, at least one use selectable optimization to the machine language routine (column 5, lines 66-67 to column 6, lines 1-3).

Per Claim 8:

The rejection of claim 1 is incorporated, and the combination of Hayashi and Buzbee further teaches wherein the optimizing changes in a sequence of a plural number of a repeated said performing resulting from the stopping criterion not met is performed according to a process

that includes at least one of a non-repeating optimizing change (Hayashi, column 6, lines 41-46), a user selectable optimization change sequence (Buzbee, column 5, lines 66-67 to column 6, lines 1-3); and a parallel search across a plural number of processing units (Hayashi, column 11, lines 61-65).

Per Claim 9:

The rejection of claim 1 is incorporated, and Buzbee further teaches wherein the initializing further includes initializing the position of at least part of said machine language routine in the first computing system memory, and the executing includes executing the machine language using the initialized position (column 4, lines 41-67).

Per Claim 10 (Amended, as best understood):

This is a machine-readable medium version of the claimed method discussed above, claim 1, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above, including "executing a measuring routine to define the measurement of a characteristic of an execution of a compiled representation of the routine" (Hayashi, column 12, lines 3-18). Thus, accordingly, this claim is also obvious.

Per Claims 13-18 (as best understood):

These are machine-readable medium versions of the claimed method discussed above (claims 4-9, respectively), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claim 19 (as best understood):

The rejection of claim 10 is incorporated, and Buzbee further teaches wherein the operations further include a user interface for reading from the user at least one of the specified values of the routine variables, and optimizing instructions wherein the performing operation includes implementing the optimizing instructions (column 5, lines 66-67 to column 6, lines 1-3).

Per Claim 20 (Amended, as best understood):

This is an apparatus version of the claimed machine-readable medium discussed above, claim 10, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claim 22 (as best understood):

This is an apparatus version of the claimed machine-readable medium discussed above, claim 17, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claims 23 (as best understood) & 25-27 (as best understood):

These are apparatus versions of the claimed machine-readable medium discussed above (claims 10 & 13-15), wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, these claims are also obvious.

Per Claim 28 (as best understood):

The rejection of claim 20 is incorporated, and Hayashi further teaches wherein the change in the intermediate routine file includes a user selectable optimization (column 15, lines 66-68 to column 16, lines 1-16).

Per Claim 29 (as best understood):

This is an apparatus version of the claimed machine-readable medium discussed above, claim 18, wherein all claim limitations also have been addressed and/or covered in cited areas as set forth above. Thus, accordingly, this claim is also obvious.

Per Claim 30 (as best understood):

The rejection of claim 20 is incorporated, and Hayashi further teaches wherein the computing system includes a plurality of processors that each have an architecture of the target computing system (column 11, lines 61-65).

Response to Arguments

17. Applicant's arguments with respect to claims 1, 4-10, 13-20, 22-23 and 25-30 have been considered but are moot in view of the new ground(s) of rejection.

In the remarks, the applicant argues that:

a) Applicant's independent claims include limitations not disclosed in Hayashi or Buzbee. Therefore, applicant's independent claims are patentable over Hayashi in view of Buzbee.

For example, applicant's independent claims include the newly added claim limitation, or a limitation similar thereto, of:

> generating a machine language ...
>
> evaluating ...

The newly added claim limitations as show above are neither disclosed nor suggested in Hayashi or Buzbee. ...

However, there is no disclosure in Hayashi or Buzbee of applicant's claimed:

> ...
>
> evaluating whether a stopping criterion after said executing is met and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met wherein said characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric. (Applicant's claim 1.)

Therefore, applicant's claims include limitations not disclosed nor suggested in Hayashi or Buzbee. As a result, applicant's claims are patentable over Hayashi in view of Buzbee.

Furthermore, the remaining claims depend from at least one of the independent claims discussed above, and therefore include the distinguishing limitations of the independent claims. As a result, applicant's remaining claims are also patentable over Hayashi in view of Buzbee.

Examiner's response:

a) Claims 1, 4-10, 13-20, 22-23 and 25-30 are ***now*** rejected under 35 U.S.C. 103(a) as being unpatentable over Hayashi (U.S. 5,396,631) in view of Buzbee (U.S. 5,815,720), and further in view of Granston (U.S. 5,966,538).

As previously pointed out in the last Office Action (Final Rejection, Mailed on 11/5/03), *Buzbee* teaches generating a machine language routine in a computer system from the intermediate language routine (column 3, lines 32-33); executing the machine language routine from the main memory of the first computing system using the initialized values; and measuring a characteristic of the execution (column 3, lines 33-34); evaluating whether a stopping criterion after said executing is met and if not, repeating said performing through said measuring, saving the machine language routine having a best measured characteristic, until the stopping criterion is met (column 6, lines 18-28 and Fig. 6; the machine language routine having a best measured characteristic is inherently saved); and *Granston* teaches that the characteristic includes at least one of a timing wherein the best measured timing is a lowest timing, a machine language routine size, and a bus utilization metric (column 4, lines 34-48).

Applicant fails to distinctly and specifically point out any error in the citations for these limitations. Instead, applicant's arguments broadly summarizes the Hayashi and Buzbee references, which amount to a general allegation that the claims define a patentable invention without specifically pointing out how the language of the claims patentably distinguishes them from the references.

See the rejection above in paragraph 16 for rejection to claims 1, 4-10, 13-20, 22-23 and 25-30.

Conclusion

18. Any inquiry concerning this communication from the examiner should be directed to Qamrun Nahar whose telephone number is (703) 305-7699. The examiner can normally be reached on Mondays through Thursdays from 9:00 AM to 6:30 PM. The examiner can also be reached on alternate Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kakali Chaki, can be reached on (703) 305-9662. The fax phone number for the organization where this application or processing is assigned is (703) 872-9306.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-3900.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

QN
August 5, 2004

KAKALI CHAKI
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2100